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To:	Examiner: Ranee R. Berry	**From:**	Leslie S. Szivos, Ph.D.
Fax:	703 872-9306	**Pages:**	34 including cover page
Phone:		**Date:**	3/17/2005
Re:	U.S. Appl. Serial No.: 10/838,849 Filed: May 3, 2004 Docket No.: YOR920040157US1 (17648)	**CC:**	

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(1)

CERTIFICATE OF TRANSMISSION BY FACSIMILE (37 CFR 1.8) Applicant(s): Stephen M. Gates, et al.			Docket No. YOR920040157US1 (17646)
Application No. 10/838,849	Filing Date May 3, 2004	Examiner Renee R. Berry	Group Art Unit 2818

Invention: METHOD FOR FABRICATING AN ULTRALOW DIELECTRIC CONSTANT MATERIAL AS AN INTERLEVEL OR INTRALEVEL DIELECTRIC IN A SEMICONDUCTOR DEVICE AND ELECTRONIC DEVICE MADE

I hereby certify that this Amendment Under 37 C.F. R. §1.111
(Identify type of correspondence)
is being facsimile transmitted to the United States Patent and Trademark Office (Fax. No. 703 872-9306
on March 17, 2005
(Date)

Leslie S. Szivos, Ph.D Registration No. 39,394
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(Signature)

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P1&REV02

(2)

AMENDMENT TRANSMITTAL LETTER (Large Entity) Applicant(s): Stephen M. Gates, et al.				Docket No. YOR920040157US1 (17646)
Application No. 10/838,849	Filing Date May 3, 2004	Examiner Renee R. Berry	Customer No. 23389	Group Art Unit 2818	Confirmation No. 5755

Invention: METHOD FOR FABRICATING AN ULTRALOW DIELECTRIC CONSTANT MATERIAL AS AN INTRALEVEL OR INTERLEVEL DIELECTRIC IN A SEMICONDUCTOR DEVICE AND ELECTRONIC DEVICE MADE

COMMISSIONER FOR PATENTS:

Transmitted herewith is an amendment in the above-identified application.

The fee has been calculated and is transmitted as shown below.

CLAIMS AS AMENDED

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST # PREV. PAID FOR		NUMBER EXTRA CLAIMS PRESENT		RATE	ADDITIONAL FEE
TOTAL CLAIMS	64	-	64	=	0	x	$50.00	$0.00
INDEP. CLAIMS	11	-	11	=	0	x	$200.00	$0.00
Multiple Dependent Claims (check if applicable) ☐								$0.00
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT								$0.00

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☐ A check in the amount of to cover the filing fee is enclosed.

☒ The Director is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account 50-0510/IBM

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Leslie S. Szivos, Ph.D.
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PTILARGE/REV09

AMENDMENT TRANSMITTAL LETTER (Large Entity)

Applicant(s): Stephen M. Gates, et al.

Docket No. YOR920040157US1 (17646)

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
10/838,849	May 3, 2004	Renee R. Berry	23389	2818	5755

Invention: METHOD FOR FABRICATING AN ULTRALOW DIELECTRIC CONSTANT MATERIAL AS AN INTRALEVEL OR INTERLEVEL DIELECTRIC IN A SEMICONDUCTOR DEVICE AND ELECTRONIC DEVICE MADE

COMMISSIONER FOR PATENTS:

Transmitted herewith is an amendment in the above-identified application.

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CLAIMS AS AMENDED

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST # PREV. PAID FOR		NUMBER EXTRA CLAIMS PRESENT		RATE	ADDITIONAL FEE
TOTAL CLAIMS	64	-	64	=	0	x	$50.00	$0.00
INDEP. CLAIMS	11	-	11	=	0	x	$200.00	$0.00
Multiple Dependent Claims (check if applicable)			☐					$0.00
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT								$0.00

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Dated: March 17, 2005

Leslie S. Szivos, Ph.D.
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(Date)

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Stephen M. Gates, et al.	**Examiner:**	Berry, Renee R
Serial No:	10/838,849	**Art Unit:**	2818
Filed:	May 3, 2004	**Docket:**	YOR920040157US1 (17646)
Dated:	March 17, 2005		

For: METHOD FOR FABRICATING AN ULTRALOW DIELECTRIC CONSTANT MATERIAL AS AN INTRALEVEL OR INTERLEVEL DIELECTRIC IN A SEMICONDUCTOR DEVICE AND ELECTRONIC DEVICE MADE

Confirmation No. 5755

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 23313-1450

AMENDMENT UNDER 37 C.F.R. § 1.111

Sir:

In response to the Office Action dated January 26, 2005, applicants submit the following amendments and remarks for consideration by the Examiner in the above-identified patent application.

CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Dated: March 17, 2005

Leslie S. Szivos, Ph.D.

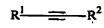
LISTING OF THE CLAIMS:

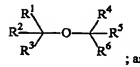
Claim 1 (Currently Amended) A method for fabricating an ultralow dielectric constant film comprising the steps of:

flowing a first precursor gas having ~~the~~ a linear molecular formula of SiRR'R"R'", where R,R',R", and R'" are the same or different and are selected from H, alkyl, and alkoxy into a chamber of a plasma enhanced chemical vapor deposition (PECVD) reactor;

flowing a second precursor gas having one of the following formulas

alkenes:  ;

alkynes:  ;

ethers:  ; and

oxiranes: 

where R^1, R^2, R^3, R^4, R^5 and R^6 may or may not be identical and are selected from hydrogen, alkyl, alkenyl or alkynyl groups that may be linear, branched, cyclic, polycyclic and may be functionalized with oxygen, nitrogen or fluorine containing substituents into said chamber; and

depositing an ultralow k film from said precursor gases on a substrate.

Claim 2 (Original) The method of Claim 1 wherein said ultralow k film is a multiphase film that comprises a first phase consisting essentially of Si, C, O and H and at least a second phase consisting essentially of C, H and a multiplicity of nanometer-sized pores on said substrate.

Claim 3 (Original) The method of Claim 1 further comprising mixing an inert gas with one or both of said precursor gases.

Claim 4 (Original) The method of Claim 1 further comprising heating said ultralow k film after deposition at a temperature not less than about 300°C for at least about 0.25 hours.

Claim 5 (Original) The method of Claim 1 further comprising treating said ultralow k film after deposition with an energy source to stabilize the ultralow k film and improve its properties, said energy source comprising one of a thermal source, a chemical source, an ultraviolet (UV) light source, an electron beam (e-beam) source, a microwave source, or a plasma source.

Claim 6 (Original) The method of Claim 1 wherein said ultralow k film has a dielectric constant of not more than about 2.5.

(7)

Claim 7 (Original) The method of Claim 1 wherein said ultralow k film has a dielectric constant from about 1.5 to about 2.5.

Claim 8 (Original) The method of Claim 1 wherein said ultralow k film comprises about 5 to about 40 atomic percent of Si; about 5 to about 45 atomic percent of C; about 0 to about 50 atomic percent of O; and about 10 to about 55 atomic percent of H.

Claim 9 (Previously Presented) The method of Claim 1 wherein said PECVD reactor has an area of a substrate chuck between about 300 cm^2 and about 800 cm^2, and a gap between the substrate and a top electrode between about 1 cm and about 10 cm.

Claim 10 (Previously Presented) The method of Claim 1 further comprising the step of applying a RF power to an electrode of said PECVD reactor.

Claim 11 (Original) The method of Claim 1 further comprising a step of UV or e-beam treating said ultralow k film at a temperature not lower than about 300°C for up to 30 minutes.

Claim 12 (Original) The method of Claim 1 further comprising a step of a combination of heat treating and UV or e-beam treating said ultralow k film.

Claim 13 (Original) The method of Claim 1 wherein said first precursor gas is diethoxymethylsilane (DEMS).

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Claim 14 (Currently Amended) The method of Claim 1 wherein said second precursor comprises bicycloheptadiene (BCHD), cyclopentene oxide (CPO), ethylene oxide, propylene oxide, isobutylene oxide, 2,2,3-trimethyloxirane, butadienemonoxide, 1,2-epoxy-5-hexene, 2-methyl-2-vinyloxirane, tertbutylmethylether, 1-isopropyl-cycloohexa-1,3-diene or mixtures thereof.

Claim 15 (Original) The method of Claim 1 wherein said step of depositing the ultralow k film further comprises the steps of setting a temperature for said substrate at between about 25°C and about 400°C; and setting a RF power density at between about 0.05 W/cm^2 and about 3.5 W/cm^2.

Claim 16 (Original) The method of Claim 1 wherein said step of depositing the ultralow k film further comprises setting a flow rate for said first precursor gas between about 5 sccm to about 1000 sccm, or between about 30 to about 6,000 mg/minute when liquid delivery is used.

Claim 17 (Original) The method of Claim 16 wherein said flow rate for said first precursor gas is between about 25 sccm to about 200 sccm, or between about 150 to about 1200 mg/minute when liquid delivery is used.

Claim 18 (Original) The method of Claim 1 wherein said step of depositing said ultralow k film further comprises setting a flow rate for said second precursor gas between about 5 sccm to about 1000 sccm, or between about 30 to about 6,000 mg/minute when liquid delivery is used.

(9)

Claim 19 (Original) The method of Claim 18 wherein said flow rate for said second precursor gas is between about 25 sccm to about 200 sccm, or between about 150 to about 1200 mg/minute when liquid delivery is used.

Claim 20 (Previously Presented) The method of Claim 1 wherein said step of depositing said ultralow k film further comprises setting a pressure for said PECVD reactor at between about 50 mtorr and about 10000 mtorr.

Claim 21 (Original) The method of Claim 20 wherein said pressure for said PECVD reactor is between about 100 mtorr and about 5000 mtorr.

Claim 22 (Original) The method of Claim 1 wherein said step of depositing said ultralow k film further comprises setting a flow rate ratio of bicycloheptadiene, as said second precursor gas, to diethoxymethylsilane, as said first precursor gas, to between about 0.1 and about 3.

Claim 23 (Original) The method of Claim 22 wherein said flow rate ratio of said bicycloheptadiene to said diethoxymethylsilane is between about 0.2 and about 0.6.

Claim 24 (Previously Presented) The method of Claim 1 wherein said PECVD reactor is run in a continuous mode.

Claim 25 (Previously Presented) The method of Claim 1 wherein said PECVD reactor is run in a pulsed mode.

(10)

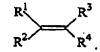
Claim 26 (Currently Amended) A method for fabricating a thermally stable ultralow k film comprising the steps of:

providing a plasma enhanced chemical vapor deposition (PECVD) reactor;

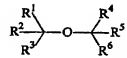
positioning a pre-processed wafer on a substrate chuck having an area between about 300 cm^2 and about 800 cm^2 and maintaining a gap between said wafer and a top electrode between about 1 cm and about 10 cm;

flowing a first precursor gas comprising linear silane derivative molecules into said PECVD reactor;

flowing at least a second precursor gas comprising a compound having one of the following formulas

alkenes:  ;

alkynes:  ;

ethers:  ; and

oxiranes: 

11

where R^1, R^2, R^3, R^4, R^5 and R^6 may or may not be identical and are selected from hydrogen, alkyl, alkenyl or alkynyl groups that may be linear, branched, cyclic, polycyclic and may be functionalized with oxygen, nitrogen or fluorine containing substituents into said PECVD reactor; and

depositing an ultralow k film on said wafer.

Claim 27 (Currently Amended) A method for fabricating a thermally stable ultralow k film comprising the steps of:

providing a plasma enhanced chemical vapor deposition (PECVD) reactor;

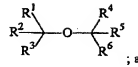
positioning a wafer on a substrate chuck having an area between about 300 cm^2 and about 800 cm^2, and maintaining a gap between the wafer and a top electrode between about 1 cm and about 10 cm;

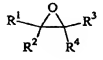
flowing into said reactor over said wafer kept at a temperature between about 25°C and about 400°C, a first precursor gas of a linear silane derivative at a flow rate between about 5 sccm and about 1000 sccm, and a second precursor gas at a flow rate between about 5 sccm and about 1000 sccm, while keeping a pressure in said reactor between about 50 mtorr and about 8000 mtorr, said second precursor gas comprising a compound having one of the following formulas

alkenes:  ;

alkynes: ;

(12)

ethers:  ; and

oxiranes: 

where R^1, R^2, R^3, R^4, R^5 and R^6 may or may not be identical and are selected from hydrogen, alkyl, alkenyl or alkynyl groups that may be linear, branched, cyclic, polycyclic and may be functionalized with oxygen, nitrogen or fluorine containing substituents;

depositing an ultralow k film on said wafer under a RF power density between about 0.05 W/cm^2 and about 3.0 W/cm^2; and

treating said ultralow k film to improve the stability of said film, said treating comprises an energy source selected from thermal, chemical, ultraviolet (UV) light, electron beam (e-beam), microwave, plasma and a combination thereof.

Claim 28 (Original) The method of Claim 27 wherein said treating comprises annealing at a temperature not less than about 300°C for at least about 0.25 hours.

Claim 29 (Withdrawn) A dielectric material comprising elements of Si, C, O and H, said dielectric material having a random covalently bonded tri-dimensional network structure, a dielectric constant of not more than 2.5 and an FTIR spectra having a Si-O absorption band that can be deconvoluted into three peaks, said elements of Si, C, O and H are derived from a first precursor having the molecular formula SiRR'R"R'" where R,R',R", and R'" are the same or

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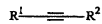
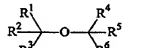
different and are selected from H, alkyl, and alkoxy, and a second precursor having one of the following formulas

alkenes:  ;

alkynes:  ;

ethers:  ; and

oxiranes: 

where R^1, R^2, R^3, R^4, R^5 and R^6 may or may not be identical and are selected from hydrogen, alkyl, alkenyl or alkynyl groups that may be linear, branched, cyclic, polycyclic and may be functionalized with oxygen, nitrogen or fluorine containing substituents.

Claim 30 (Withdrawn) The dielectric material of Claim 29 wherein said random covalently bonded tri-dimensional structure comprises Si-O, Si-C, Si-H, C-H and C-C bonds.

Claim 31 (Withdrawn) The dielectric material of Claim 29 wherein said dielectric material is thermally stable to a temperature of at least 430°C.

Claim 32 (Withdrawn) The dielectric material of Claim 29 wherein said dielectric material further comprises a multiplicity of nanometer-sized pores.

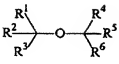
Claim 33 (Withdrawn) The dielectric material of Claim 32 wherein diameters of said multiplicity of nanometer-sized pores are between about 0.3 and about 50 nanometers.

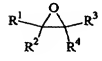
Claim 34 (Withdrawn) A back-end-of-the-line (BEOL) interconnect structure comprising a dielectric material as a BEOL insulator, cap or hardmask layer, said dielectric material comprising elements of Si, C, O and H, and having a random covalently bonded tri-dimensional network structure, a dielectric constant of not more than 2.5 and an FTIR spectra having a Si-O absorption band that can be deconvoluted into three peaks, said elements of Si, C, O and H are derived from a first precursor having the molecular formula SiRR'R'R'" where R,R',R", and R'" are the same or different and are selected from H, alkyl, and alkoxy, and a second precursor having one of the following formulas

alkenes:  ;

alkynes:  ;

15

ethers:  ; and

oxiranes: 

where R^1, R^2, R^3, R^4, R^5 and R^6 may or may not be identical and are selected from hydrogen, alkyl, alkenyl or alkynyl groups that may be linear, branched, cyclic, polycyclic and may be functionalized with oxygen, nitrogen or fluorine containing substituents.

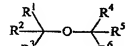
Claim 35 (Withdrawn) An electronic structure having layers of insulating material as intralevel or interlevel dielectrics in a wiring structure comprising:

a pre-processed semiconducting substrate having a first region of metal embedded in a first layer of insulating material;

a first region of conductor embedded in a second layer of insulating material formed of an ultralow k material, said ultralow k material comprising Si, C, O and H, and a multiplicity of nanometer-sized pores, said ultralow k material having a dielectric constant of not more than about 2.5 and an FTIR spectra having a Si-O absorption band that can be deconvoluted into three peaks, said elements of Si, C, O and H are derived from a first precursor having the molecular formula SiRR'R"R'" where R,R',R", and R'" are the same or different and are selected from H, alkyl, and alkoxy, and a second precursor having one of the following formulas

alkenes:  ;

alkynes:  ;

ethers:  ; and

oxiranes: 

where R^1, R^2, R^3, R^4, R^5 and R^6 may or may not be identical and are selected from hydrogen, alkyl, alkenyl or alkynyl groups that may be linear, branched, cyclic, polycyclic and may be functionalized with oxygen, nitrogen or fluorine containing substituents, said second layer of insulating material being in intimate contact with said first layer of insulating material, said first region of conductor being in electrical communication with said first region of metal; and

a second region of conductor being in electrical communication with said first region of conductor and being embedded in a third layer of insulating material comprising said ultralow k material, said third layer of insulating material being in intimate contact with said second layer of insulating material.

Claim 36 (Withdrawn) The electronic structure of Claim 35 further comprising a dielectric cap layer situated between said second layer of insulating material and said third layer of insulating material.

Claim 37 (Withdrawn) The electronic structure of Claim 35 further comprising a first dielectric cap layer between said second layer of insulating material and said third layer of insulating material; and a second dielectric cap layer on top of said third layer of insulating material.

Claim 38 (Withdrawn) The electronic structure of Claim 36 wherein said dielectric cap layer is formed of a material selected from the group consisting of silicon oxide, silicon nitride, silicon oxynitride, refractory metal silicon nitride, silicon carbide, silicon carbon nitride, silicon carbo-oxide, and carbon doped oxides and their hydrogen-containing compounds.

Claim 39 (Withdrawn) The electronic structure of Claim 35 wherein said refractory metal silicon nitride includes a refractory metal selected from the group consisting of Ta, Zr, Hf and W.

Claim 40 (Withdrawn) The electronic structure of Claim 37 wherein said first dielectric cap layer and said second dielectric cap layer are formed of a material selected from the group consisting of silicon oxide, silicon nitride, silicon oxynitride, refractory metal silicon nitride, silicon carbide, silicon carbon nitride, silicon carbo-oxide, carbon doped oxides and their hydrogen-containing compounds.

Claim 41 (Withdrawn) The electronic structure of Claim 40 wherein said refractory metal silicon nitride includes a refractory metal selected from the group consisting of Ta, Zr, Hf and W.

Claim 42 (Withdrawn) The electronic structure of Claim 35 wherein said first layer of insulating material is one selected from the group consisting of silicon oxide, silicon nitride, phosphosilicate glass (PSG), borophosphosilicate glass (BPSG), and other doped varieties of these materials.

Claim 43 (Withdrawn) The electronic structure of Claim 35 further comprising a diffusion barrier layer of a dielectric material deposited on at least one of said second layer of insulating material and said third layer of insulating material.

Claim 44 (Withdrawn) The electronic structure of Claim 35 further comprising a dielectric reactive ion etching (RIE) hard mask/polish stop layer on top of said second layer of insulating material, and a dielectric diffusion barrier layer on top of said RIE hard mask/polish stop layer.

Claim 45 (Withdrawn) The electronic structure of Claim 35 further comprising a first dielectric RIE hard mask/polish stop layer on top of said second layer of insulating material; a first dielectric diffusion barrier layer on top of said first dielectric RIE hard mask/polish stop layer; a second dielectric RIE hard mask/polish stop layer on top of said third layer of insulating material; and a second dielectric diffusion barrier layer on top of said second dielectric RIE hard mask/polish stop layer.

(19)

Claim 46 (Withdrawn) The electronic structure of Claim 45 further comprising a dielectric cap layer between an interlevel dielectric of an ultralow k material and an intralevel dielectric of an ultralow k material.

Claim 47 (Withdrawn) An electronic structure having layers of insulating material as intralevel or interlevel dielectrics in a wiring structure comprising:

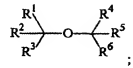
a pre-processed semiconducting substrate having a first region of metal embedded in a first layer of insulating material; and

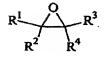
at least one first region of conductor embedded in at least one second layer of insulating material formed of an ultralow k material, said ultralow k material consisting essentially of Si, C, O and H, and a multiplicity of nanometer-sized pores, said ultralow k material having a dielectric constant of not more than about 2.8 and an FTIR spectra having a Si-O absorption band can be deconvoluted into three peaks, said elements of Si, C, O and H are derived from a first precursor having the molecular formula SiRR'R"R'" where R,R',R", and R'" are the same or different and are selected from H, alkyl, and alkoxy, and a second precursor having one of the following formulas

alkenes:  ;

alkynes: ;

(20)

ethers:  ; and

oxiranes: 

where R^1, R^2, R^3, R^4, R^5 and R^6 may or may not be identical and are selected from hydrogen, alkyl, alkenyl or alkynyl groups that may be linear, branched, cyclic, polycyclic and may be functionalized with oxygen, nitrogen or fluorine containing substituents, one of said at least one second layer of insulating material being in intimate contact with said first layer of insulating material, one of said at least one first region of conductor being in electrical communication with said first region of metal.

Claim 48 (Withdrawn) The electronic structure of Claim 47 further comprising a dielectric cap layer situated between each said at least one second layer of insulating material.

Claim 49 (Withdrawn) The electronic structure of Claim 47 further comprising a first dielectric cap layer between each of said at least one second layer of insulating material; and a second dielectric cap layer on top of said topmost second layer of insulating material.

Claim 50 (Withdrawn) The electronic structure of Claim 49 wherein said first dielectric cap layer and said second dielectric cap layer are formed of an ultralow k material.

(21)

Claim 51 (Withdrawn) The electronic structure of Claim 49 wherein said first dielectric cap layer and said second dielectric cap layer are formed of a modified ultralow k material.

Claim 52 (Withdrawn) The electronic structure of Claim 49 wherein said dielectric cap layer is formed of a material selected from the group consisting of silicon oxide, silicon nitride, silicon oxynitride, refractory metal silicon nitride, silicon carbide, silicon carbon nitride, silicon carbo-oxide, carbon doped oxides and their hydrogen-containing compounds.

Claim 53 (Withdrawn) The electronic structure of Claim 47 wherein said refractory metal silicon nitride includes a refractory metal selected from the group consisting of Ta, Zr, Hf and W.

Claim 54 (Withdrawn) An electronic structure having layers of insulating material as intralevel or interlevel dielectrics in a wiring structure comprising:

a pre-processed semiconducting substrate having a first region of metal embedded in a first layer of insulating material;

a first region of conductor embedded in a second layer of insulating material, said second layer of insulating material being in intimate contact with said first layer of insulating material, said first region of conductor being in electrical communication with said first region of metal; a second region of conductor being in electrical communication with said first region of conductor and being embedded in a third layer of insulating material, said third layer of insulating material being in intimate contact with said second layer of insulating material;

a first dielectric cap layer between said second layer of insulating material and said third layer of insulating material, and

Claim 51 (Withdrawn) The electronic structure of Claim 49 wherein said first dielectric cap layer and said second dielectric cap layer are formed of a modified ultralow k material.

Claim 52 (Withdrawn) The electronic structure of Claim 49 wherein said dielectric cap layer is formed of a material selected from the group consisting of silicon oxide, silicon nitride, silicon oxynitride, refractory metal silicon nitride, silicon carbide, silicon carbon nitride, silicon carbo-oxide, carbon doped oxides and their hydrogen-containing compounds.

Claim 53 (Withdrawn) The electronic structure of Claim 47 wherein said refractory metal silicon nitride includes a refractory metal selected from the group consisting of Ta, Zr, Hf and W.

Claim 54 (Withdrawn) An electronic structure having layers of insulating material as intralevel or interlevel dielectrics in a wiring structure comprising:

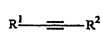
a pre-processed semiconducting substrate having a first region of metal embedded in a first layer of insulating material;

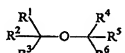
a first region of conductor embedded in a second layer of insulating material, said second layer of insulating material being in intimate contact with said first layer of insulating material, said first region of conductor being in electrical communication with said first region of metal; a second region of conductor being in electrical communication with said first region of conductor and being embedded in a third layer of insulating material, said third layer of insulating material being in intimate contact with said second layer of insulating material;

a first dielectric cap layer between said second layer of insulating material and said third layer of insulating material, and

a second dielectric cap layer on top of said third layer of insulating material wherein said first and said second dielectric cap layers are formed of an ultralow k dielectric material, said ultralow k material comprising Si, C, O and H, and a multiplicity of nanometer-sized pores, said ultralow k material having a dielectric constant of not more than about 2.5 an FTIR spectra having a Si-O absorption band that can be deconvoluted into three peaks, said elements of Si, C, O and H are derived from a first precursor having the molecular formula SiRR'R"R'" where R,R',R", and R'" are the same or different and are selected from H, alkyl, and alkoxy, and a second precursor having one of the following formulas

alkenes:  ;

alkynes:  ;

ethers:  ; and

oxiranes: 

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where R^1, R^2, R^3, R^4, R^5 and R^6 may or may not be identical and are selected from hydrogen, alkyl, alkenyl or alkynyl groups that may be linear, branched, cyclic, polycyclic and may be functionalized with oxygen, nitrogen or fluorine containing substituents.

Claim 55 (Withdrawn) An electronic structure having layers of insulating material as intralevel or interlevel dielectrics in a wiring structure comprising:

a pre-processed semiconducting substrate having a first region of metal embedded in a first layer of insulating material;

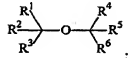
a first region of conductor embedded in a second layer of insulating material, said second layer of insulating material being in intimate contact with said first layer of insulating material, said first region of conductor being in electrical communication with said first region of metal;

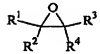
a second region of conductor being in electrical communication with said first region of conductor and being embedded in a third layer of insulating material, said third layer of insulating material being in intimate contact with said second layer of insulating material; and

a diffusion barrier layer formed of a material comprising an ultralow k dielectric material deposited on at least one of said second layer and said third layer of insulating material, said ultralow k material comprising Si, C, O and H, and a multiplicity of nanometer-sized pores, said ultralow k material having a dielectric constant of not more than about 2.5 and an FTIR spectra having a Si-O absorption band that can be deconvoluted into three peaks, said elements of Si, C, O and H are derived from a first precursor having the molecular formula SiRR'R"R'" where R,R',R", and R'" are the same or different and are selected from H, alkyl, and alkoxy, and a second precursor having one of the following formulas

alkenes:  ;

alkynes:  ;

ethers:  ; and

oxiranes: 

where R^1, R^2, R^3, R^4, R^5 and R^6 may or may not be identical and are selected from hydrogen, alkyl, alkenyl or alkynyl groups that may be linear, branched, cyclic, polycyclic and may be functionalized with oxygen, nitrogen or fluorine containing substituents.

Claim 56 (Withdrawn) An electronic structure having layers of insulating material as intralevel or interlevel dielectrics in a wiring structure comprising:

a pre-processed semiconducting substrate having a first region of metal embedded in a first layer of insulating material;

a first region of conductor embedded in a second layer of insulating material, said second layer of insulating material being in intimate contact with said first layer of insulating material, said first region of conductor being in electrical communication with said first region of metal;

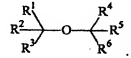
a second region of conductor being in electrical communication with said first region of conductor and being embedded in a third layer of insulating material, said third layer of insulating material being in intimate contact with said second layer of insulating material;

a reactive ion etching (RIE) hard mask/polish stop layer on top of said second layer of insulating material, and

a diffusion barrier layer on top of said RIE hard mask/polish stop layer, wherein said RIE hard mask/polish stop layer and said diffusion barrier layer are formed of a an ultralow k dielectric material, said ultralow k material comprising Si, C, O and H, and a multiplicity of nanometer-sized pores, said ultralow k material having a dielectric constant of not more than about 2.5 and an FTIR spectra having a Si-O absorption band that can be deconvoluted into three peaks, said elements of Si, C, O and H are derived from a first precursor having the molecular formula SiRR'R"R'" where R,R',R", and R'" are the same or different and are selected from H, alkyl, and alkoxy, and a second precursor having one of the following formulas

alkenes:  ;

alkynes:  ;

ethers:  ; and

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oxiranes: 

where R^1, R^2, R^3, R^4, R^5 and R^6 may or may not be identical and are selected from hydrogen, alkyl, alkenyl or alkynyl groups that may be linear, branched, cyclic, polycyclic and may be functionalized with oxygen, nitrogen or fluorine containing substituents.

Claim 57 (Withdrawn) An electronic structure having layers of insulating material as intralevel or interlevel dielectrics in a wiring structure comprising:

a pre-processed semiconducting substrate having a first region of metal embedded in a first layer of insulating material,

a first region of conductor embedded in a second layer of insulating material, said second layer of insulating material being in intimate contact with said first layer of insulating material, said first region of conductor being in electrical communication with said first region of metal; a second region of conductor being in electrical communication with said first region of conductor and being embedded in a third layer of insulating material, said third layer of insulating material being in intimate contact with said second layer of insulating material;

a first RIE hard mask/polish stop layer on top of said second layer of insulating material;

a first diffusion barrier layer on top of said first RIE hard mask/polish stop layer;

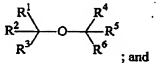
a second RIE hard mask/polish stop layer on top of said third layer of insulating material; and

a second diffusion barrier layer on top of said second RIE hard mask/polish stop layer, wherein said RIE hard mask/polish stop layers and said diffusion barrier layers are formed of a

ultralow k dielectric material comprising Si, C, O and H, and a multiplicity of nanometer-sized pores, said ultralow k material having a dielectric constant of not more than about 2.8 and an FTIR spectra having a Si-O absorption band that can be deconvoluted into three peaks, said elements of Si, C, O and H are derived from a first precursor having the molecular formula SiRR'R"R'" where R,R',R", and R'" are the same or different and are selected from H, alkyl, and alkoxy, and a second precursor having one of the following formulas

alkenes:  ;

alkynes:  ;

ethers:  ; and

oxiranes: 

where R^1, R^2, R^3, R^4, R^5 and R^6 may or may not be identical and are selected from hydrogen, alkyl, alkenyl or alkynyl groups that may be linear, branched, cyclic, polycyclic and may be functionalized with oxygen, nitrogen or fluorine containing substituents.

Claim 58 (Original) The electronic structure of Claim 57 further comprising a dielectric cap layer formed of a material comprising said ultralow k dielectric material situated between an interlevel dielectric layer and an intralevel dielectric layer.

Claim 59 (Previously Presented) The method of Claim 1 wherein said PECVD reactor is a parallel plate reactor.

Claim 60 (Previously Presented) The method of Claim 1 further comprising forming a plasma within said PECVD reactor.

Claim 61 (Previously Presented) The method of Claim 26 wherein said PECVD reactor is a parallel plate reactor.

Claim 62 (Previously Presented) The method of Claim 26 further comprising forming a plasma within said PECVD reactor.

Claim 63 (Previously Presented) The method of Claim 27 wherein said PECVD reactor is a parallel plate reactor.

Claim 64 (Previously Presented) The method of Claim 27 further comprising forming a plasma within said PECVD reactor.

REMARKS

Favorable consideration and allowance of the claims of the present application are respectfully requested.

Before addressing the specific grounds of rejection raised in the present Office Action, applicants have made amendments to Claims 1, 14, 26 and 27. Specifically, Claims 1, 26 and 27 have been amended to positively recite that the first precursor is a linear molecule. Support for this amendment to Claims 1, 26 and 27 is found in the formula appearing at paragraph [0010] of the present application whereat the Si atom includes four substituents, none of which include a cyclic moiety.

With respect to Claim 14, applicants have inserted the term "Claim" into line 1 so that the claim properly refers back to Claim 1.

Since the above amendments to the claims do not introduce new matter into the specification of the instant application, entry thereof is respectfully requested.

Applicants observe that in the present Office Action, Claims 1-64 are said to be pending in the instant application. Of these claims, Claims 1-28 are rejection and Claims 29-64 have been withdrawn. Applicants take issue that Claims 59-64 have been withdrawn in the present application since those claims are method related claims, which are dependent on independent claims that are presently pending in this case. For example, Claims 59 and 60 are dependent on Claim 1, Claims 61 and 62 are dependent on Claim 26, and Claims 63 and 64 are dependent on Claim 27. Applicants submit that since Claims 59-64 are method claims that further limit the scope of independent Claims 1, 26 and 27 those claims should be examined in conjunction with Claims 1-28. Appropriate correction is required in the next communication from the United States Patent and Trademark Office on this issue.

(31)

Referring back to the present Office Action, Claims 1-28 stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over the combined disclosures of U.S. Patent No. 6,790,789 to Grill, et al. ("Grill, et al.") and U.S. Patent No. 6,716,770 to O'Neill, et al. ("O'Neill, et al.").

Insofar as the § 103 rejection is concerned, applicants submit that the statute under 35 U.S.C. § 103(c) states that:

> Subject matter developed by another person, which qualifies as prior art only under one or more subjections (e), (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Applicants submit that the Grill, et al. reference can be applied by the Examiner as prior art under 35 U.S.C. § 103 via 35 U.S.C. § 102(e). Applicants note in this regard that MPEP § 706.02(k) states that:

> Effective November 29, 1999, subject matter which was prior art under former 35 U.S.C. § 103 via 35 U.S.C. § 102(e) is now disqualified as prior art against the claimed invention if that subject matter and the claimed invention "were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person."

This change to 35 U.S.C. § 103 is applicable to all utility, design, and plant applications filed on or after November 29, 1999 including continued prosecution applications (CPA) filed under 37 C.F.R. § 1.53(d). Applicants note that the present application was filed on May 3, 2004; therefore the present application is entitled to the above change in 35 U.S.C. § 103.

In view of this, and the fact the present application and Grill, et al. "were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person", the Grill, et al. reference is disqualified as a reference under 35 U.S.C. § 103(c).

To evidence that the instant application and Grill, et al. "were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person", the assignment document of the present application (which was filed with the United

States Patent and Trademark Office on August 31, 2004) was compared with the recorded assignment of Grill, et al. In both instances, the inventors conveyed their entire interest to International Business Machines Corporation; therefore establishing common ownership between the instant application and Grill, et al. In view of the above information, Grill, et al. are disqualified as art under § 103(c).

Applicants further observe that even if Grill, et al. cannot be disqualified as art the applied reference does not render the claimed methods of the present invention obvious for at least the following reason: Grill, et al. do not teach or suggest a method in which a first precursor gas comprising a linear Si compound is used in conjunction with a second precursor which includes one of an alkene, an alkyne, an ether or an oxirane, as presently recited in the claims, to provide an ultralow k dielectric film. In contrast, Grill, et al. disclose a method in which a first cyclic precursor (See Col. 3, lines 35-38 and Col. 7, lines 46-63) is used in conjunction with a second cyclic precursor (See Col 3, lines 38-41 and Col 7, line 66-Col. 7, line 17). Grill, et al. do not teach or suggest the use of the claimed first precursor or the claimed second precursor, let alone using both the claimed precursors in conjunction with each other.

Because Grill, et al. do not teach or suggest the claimed second precursor, applicants take issue with the Examiner's statement regarding Claim 14 and that Grill, et al. disclose the same. Applicants have read Col. 9, lines 18-24 of Grill, et al. and find no reference to the claimed compounds therein. Instead, Grill, et al. discloses at Col. 9, lines 18-24 the use of TMCTS (tetramethyl*cyclo*tetrasiloxane) and CPO (*cyclo*pentene oxide), not any of the compounds that are recited in Claim 14.

O' Neill, et al. alone (if the Grill, et al. is disqualified as art) or the combination of O'Neill, et al. with Grill, et al. are defective since the applied secondary reference does not teach or suggest the use of the claimed precursors. Specifically, O'Neill, et al. provide a method of

forming an organofluorosilicate glass film by introducing into a vacuum chamber gaseous reagents including a fluorine-containing gas, an oxygen-containing gas and at least one Si precursor. Applicants observe that in O'Neill, et al. the Si precursor can include linear as well as cyclic compounds, while in the claimed invention only linear Si-containing precursors are disclosed. Applicants further observe that in O'Neill, et al. a fluorine-containing gas is a required element since that applied reference is directed to making organofluorosilicate glass dielectric films. In the claimed invention, a fluorine-containing precursor is not a requirement. Applicants further observe that in O'Neill, et al. organic precursors are optionally employed while they are required in the claimed methods. Applicants submit that there is insufficient motivation in O'Neill, et al. for selecting a linear Si-containing precursor and an organic precursor, without the use of a separate fluorine-containing precursor. As such, the claims of the present application are not rendered obvious by the disclosure of O'Neill, et al. by itself, or in combination with Grill, et al. Indeed, the combination of Grill, et al. and O'Neill, et al. would result in forming a dielectric film using a cyclic Si precursor (a requirement of Grill, et al.), a cyclic organic precursor (another requirement of Grill) with a fluorine-containing precursor (a requirement of O' Neill, et al.).

The § 103 rejection also fails because there is no motivation in Grill, et al. and O'Neill, et al. which suggests modifying the methods disclosed therein to include applicants' claimed features, as recited in the claims of the present application. The rejection is thus improper since the prior art *does not* suggest this drastic modification. The law requires that a prior art reference provide some teaching, suggestion, or motivation to make the modification obvious.

Here, there is no motivation provided in the disclosures of the applied prior art reference, or otherwise of record, which would lead one skilled in the art to modify the methods of the applied references to provide applicants' claimed combination of precursors. "The mere fact that

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the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." *In re Fritch*, 972 F.2d, 1260,1266, 23 USPQ 1780,1783-84 (Fed. Cir. 1992).

Based on the above remarks, the § 103 rejection of the claims has been obviated; therefore reconsideration and withdrawal of the instant rejection are respectfully requested.

Thus, in view of the foregoing amendments and remarks, it is firmly believed that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,

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BERRY, RENEE R	
ART UNIT	**PAPER NUMBER**
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DATE MAILED: 01/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/838,849	GATES ET AL	
	Examiner	Art Unit	
	Renee R Berry	2818	

-- The MAILING DATE of this communication appears on the cover she t with the correspond nc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-64* is/are pending in the application.

4a) Of the above claim(s) *29-64* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 6,790,789 to Grill et al. in view of US Patent No. 6,716,770 to O'Neill et al.

In regards to claims1, 26 and 27, teaches a method for fabricating an ultralow dielectric constant film comprising the steps of:

flowing a first precursor gas having the molecular formula SiRR'R"R"' where R,R',R" and R"' are the same or different and are selected from H, alkyl, and alkoxy into a chamber of a plasma enhance chemical vapor deposition (PECVD) reactor; flowing a second precursor gas having one of the following formulas alkenes, alkynes, ethers, oxiranies where R1 , R2 , R3, R4, R5 and R6 ...may or may not be identical and are selected from hydrogen, alkyl, alkenyl, or alkynyl groups that may be linear, branched, cyclic, polycyclic and may be functionalized with oxygen, nitrogen or fluorine containing substituents into said chamber, and depositing a ultralow K film said precursor gases on a substrate.

In regards to claim 2, Grill teaches the method of Claim 1 wherein said ultralow k film is a multiphase film that comprises a first phase consisting essentially of Si, C, O

and H and at least a second phase consisting essentially of C, H and a multiplicity of nanometer-sized pores on said substrate at column 14, lines 45-48, claim 1.

In regards to claim 3, Grill teaches the method of Claim 1 further comprising mixing an inert gas with one or both of said precursor at column 9, line 60.

In regards to claim 4, Grill teaches the method of Claim 1 further comprising heating said ultralow k film after deposition at a temperature not less than about 300 ^{0}C for at least about 0.25 hours at column 14, lines 59-61, claim 5.

In regards to Claim 5, Grill teaches the method of Claim 1 further comprising treating said ultralow k film after deposition with an energy source to stabilize the ulkalow k film and improve its properties, said energy source comprising one of a thermal source, a chemical source, an ultraviolet (UV) light source, an electron beam (e-beam) source, a microwave source, or a plasma source at column 13, lines 33-35.

In regards to claim 6, Grill teaches the method of claim 1 wherein said ultralow k film has a dielectric constant of not more than about 2.5 at column 14, lines 66-67, claim 8.

In regards to claim 7, Grill teaches the method of Claim 1 wherein said ultralow k film has a dielectric constant from about 1.5 to about 2.5 at column 14, lines 66-67, claim 8.

In regards to claim 8, Grill teaches the method of Claim 1 wherein said ultralow k film comprises about 5 to about 40 atomic percent of Si; about 5 to about 45 atomic percent of C; about 0 to about 50 atomic percent of 0; about 10 to about 55 atomic percent of H at column 15, line 6, claim 9.

In regards to claim 9, Grill teaches the method of Claim 1 wherein said PECVD reactor has an area of a substrate chuck between about 300 cm^2 and about 800 cm^2 and a gap between the substrate and a top electrode between about 1 cm and about 10 cm at column 16, lines 33-37.

In regards to claim 10, Grill teaches the method of Claim 1 further comprising the step of applying a RF power to an electrode of said PECVD reactor at column 13, lines 33-35.

In regards to claim 14, Grill teaches the method of 1 wherein said second precursor comprises bicycloheptndiene (BCHD), cyclopentene oxide (CPO), ethylene oxide, propylœe oxide, isobutylene oxide, 2,2,3-trimethyloxinme, butadienemonoxide, 1,2-epoxy-5-hexene, 2-methyl-2-vinyloxinme, tertbutylmethylether, l-isopropyl-cyclxhexa-ly3-éene or mixtures thereof at column 9, lines 18-24.

In regards to claim 15, Grill teaches the method of Claim 1 wherein said step of depositing the ultralow k film further comprises the steps of setting a temperature for said substrate at between about 25 °C and about 400 °C; and setting a RF power density at between about 0.05 W/cm^2 and about 3.5 W/cm^2 at column 9, lines 46-52.

In regards to claim 16, Grill teaches the method of Claim 1 wherein said step of depositing the ultralow k film further comprises setting a flow rate for said first precursor gas between about 5 sccm to from 1000 sccm, or between about 30 to about 6,000 mg/minute when liquid delivery is used at column 9, lines 53-55.

In regards to claim 17, Grill teaches the method of Claim 16 wherein said. flow rate for said first precursor gas is between- about 25 sccm to about 200 sccm, or

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between about 150 to about 1200 mg/minute when liquid delivery is used at column 9, lines 53-55.

In regards to claim 18, Grill teaches the method of Claim 1 wherein said step of depositing said ultralow k film further comprising a flow rate for said second precursor gas between about 5 sccm to about 1000 sccm, or between about 30 to about 6,000 mg/minute when liquid delivery is used at column 9, lines 55-59.

In regards to claim 19, Grill teaches the method of Claim 18 wherein said flow rate for said second precursor gas is between about 25 sccm to about 200 sccm or between about 150 to about 1200 mg/minute when liquid delivery is used at column 9, lines 60-64.

In regards to claim 20, Grill teaches the method of Claim 1 when said step of depositing said ultralow k film further comprises setting a pressure for said PECVD reactor at between about 50 mtorr and about 10000 mtorr at column 10, lines 1-3

In regards to claim 21, Grill teaches the method of Claim 20 wherein said pressure for said PECVD reactor is between about 100 mtorr and about 5000 mtorr at column 10, lines 1-3.

Claim 24, Grill teaches the method of Claim 1 wherein said PECVD reactor is nm in a continuous mode at column 16, lines 25-26, claim 30.

Claim 25, Grill teaches the method of Claim 1 wherein said PECVD reactor is run in a pulsed mode at column 16, lines 27-28, claim 31.

In regards to claim 28, Grill teaches the method of Claim 27 wherein said treating comprises annealing at a temperature not less than about 300 ^{o}C for at least about 0.25 hours at column 14, lines 59-61.

However, Grill does not teach all the limitations of the claims.

In regards to claims1 and 13, O'Neill teaches the method of Claim 1 wherein said first precursor gas is diethoxymethylsilane (DEMS) at column 14, lines 15-18.

In regards to claim 22, O'Neill teaches the method of Claim 1 wherein said step of depositing said ultralow k film further comprises setting a flow rate ratio of bicyclohcptndiene, as said second precursor gas, to dieloxymethylsilane, as said first precursor gas, to between about 0.1 and about 3 at column 13, lines 64-66 and column 14, lines 1-14.

In regards to claim 23, O'Neill teaches the method of Claim 22 wherein said flow rate ratio of said bicycloheptadiene to said diethoxmethylsilane is between about 0.2 and about 0.6 at column 13, lines 64-66 and column 14, lines 1-14.

Therefore, it would have been obvious to one having ordinary skill in the art to have modified Grill to include a first precursor gas is diethoxymethylsilane (DEMS); a step of depositing said ultralow k film further comprises setting a flow rate ratio of bicyclohcptndiene, as said second precursor gas, to dieloxymethylsilane, as said first precursor gas, to between about 0.1 and about 3, since such a modification would result in the desired mechanical, dielectric, thermal and oxidative stability properties that are paramount for integrating low K dielectric materials, as described in column 3, lines 58-61 of O'Neill et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renee R. Berry whose telephone number is (571) 272-1774. The examiner can normally be reached on M-F 9-5:30.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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RRB

January 3, 2005

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